Food & Pharmaceutical Markets

Lowest Total Cost of Ownership

A program to assist suppliers of systems and components prove to customers that their products safely capture combustible, hazardous and valuable dust with the lowest total cost of ownership.

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TCO Factors

Throughout this presentation there is a focus on cost of ownership factors which suppliers need to validate in order to prove lowest cost of ownership. Comments highlighting TCO factors are shown in red.

The Industrial Internet of Wisdom

The Industrial Internet of Wisdom provides support information for Lowest Total Cost of Ownership Validation. This can include process information, testing weaknesses, regulation interpretation or other authoritative data. Throughout this presentation there are IIoW comments in orange.

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Many process requirements may make elimination of combustible dust, mist, or fume impractical. Donaldson observes that it may still be very possible to manage the dispersion of dust within a plant by using an appropriate and effective industrial ventilation system including dust collection. A well designed, maintained, and operated industrial ventilation system including effective hoods, proper duct sizes, and properly selected collection equipment can provide effective dust control and can therefore help manage the presence of dispersed dust.

This not only reduces housekeeping frequency and expense but could help reduce the risk of dust explosions or fires in a facility, by helping reduce the presence of dispersed fuel.

Donaldson has a comprehensive content marketing program to convince customers that Donaldson has the lowest total cost of ownership for combustible dust applications in many different industries Details on the Donaldson program are shown in the final slides in this presentation

The focus of this presentation is to use combustible dust collection as an example of a Holistic Content Marketing Program using the Industrial Internet of Wisdom (IIoW)
http://home.mcilvainecompany.com/index.php/30-general/1658-holistic-content-marketing-program

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McIlvaine's Role

- Holistic content marketing is effective only if directed at the most profitable potential niches.
- Content Marketing is expensive and there needs to be a market forecast of the potential in each niche, shares of competitors and an analysis of the total cost of ownership factors.
- There needs to be utilization of an Industrial Internet of Wisdom (IIoW) to persuade customers that the product offered by the supplier has the lowest total cost of ownership (LTCO).
- This IIoW can be created by the supplier through investing in various forms of promotion and encouraging media partners to provide more total cost of ownership factors.
- The McIlvaine role is to provide the forecasts in each niche and advise relative to TCO factors.

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Forecasts Segmented to Provide Content Marketing Budget for Each Niche

- 80 major countries and segmentation to 250 entitles including states and provinces
- Forecast any industry such as food but with further segmentation into grain, sugar and even segment sugar by cane and beet
- Forecast sales revenues
- Estimate market share potential
- Determine potential gross margin based on total cost of ownership validation (LTCOV)

Subject	2018	2019	2020	2021	2022	2023	2024	2025
Bags								
Equipment	Dust collectors, valves, instrumentation, fans, explosion protection							
Media								
Systems								

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McIlvaine Fabric Filter Knowledge System and Fabric Filter World Markets

When introduced in 1974 the Fabric Filter Knowledge System with a 2,000-page loose leaf continually updated manual, newsletter and library article retrieval system played a unique role. Today that system is all digital and is focused on markets, shares, and TCO factors. However, it is still a valuable technical resource as per the following combustible dust examples.

Articles in Previous Fabric Filter Newsletters and abstracts in Knowledge System

- There are 900 articles with combustible in the text
- 89 articles contain both combustible and grain

FF 99 06 08 "Preventing Dust Explosions – Chemical Plants Can Learn Some Lessons from the Grain Industry" by Joseph F. Louvar, BASF Corp., Wyandotte, MI. Chemical Processing, April 1999, 5 p.
Grain elevator disasters killed a number of workers during the 1970s and 1980s. By the early '90s, the grain industry improved the handling and storage technology and orchestrated an effective education campaign,

There are 548 Articles about Donaldson of which 78 also include the word grain

Donaldson Introduces Rugged Pleat Baghouse Dust Collector
Donaldson Company, Inc. has introduced the Donaldson Torit® Rugged Pleat (RP) baghouse industrial dust collector. The collector is designed to capture heavy and abrasive dust inherent to woodworking, mining, grain processing and other industries.
The new RP baghouse collector features Donaldson's SuperSep™ inlet which pre-separates up to 97 percent of the dust before it hits the filters and the PerfectPulse™ cleaning system focuses cleaning--

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Total Cost Of Ownership Factors and Profit

- Systems versus components: a dust collector system supplier has the opportunity to persuade the customer that his superior knowledge of the application will allow him to provide the best solution. The components supplier needs to show that his design is better than that of his competitors.
- Some factors are location specific. Energy cost in some countries is twice what it is in others.
- The cost of lost production time or product varies widely from gene therapy drugs which can cost many thousands of dollars per pound to flour at pennies per pound.
- The cost of ownership factors vary depending on whether the dust is valuable, toxic, or highly explosive.
- Background documents by EPA, OSHA and governments around the world provide some standard methods for evaluating the cost of injuries, loss of life and contamination of the environment.
- There are expert consultants in powder and bulk processing who can help provide uniformity to cost of ownership evaluations. But creating an IIoW with input by many is very important.
- The market opportunity is shaped by the costs. For example, for some metal dusts the risk of explosion is best mitigated by using a wet scrubber rather than a fabric filter.
- The supplier needs to evaluate those applications where he can achieve the highest level of sales with the highest margins.
- In general, the same profit achieved with lower sales volume results in higher ROI even if the customer persuasion cost is relatively significant.

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Food & Pharmaceutical Content Marketing Opportunities in the Summer 2021

- Here is information on the IIoW opportunities this summer
- They include the Powder Bulk exhibition in August.
- This is the largest display of food & pharmaceutical dust collection systems and components.

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2021 Summer Opportunities

Powder Bulk
August
Chicago

Powder Bulk Solids
Powder and Bulk
Engineering
Chemical Processing
Processing
Industrial Filtration News

Powder Bulk
August
Chicago

Including blogs and podcasts

Direct mail etc

Applications

There are many combustible dust applications. Just two industries have been utilized as examples in this presentation.

Within each industry there can be many distinct niches each of which has different total cost of ownership factors.

Some may have dusts which are combustible and valuable. Others are combustible and toxic.

Some may present just a fire hazard others also present an explosion potential.

Each operator wants to understand the TCO factors which apply to his specific operation

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Grain

NAICS 3112

NAICS	Application	Number of U.S. Plants
3112	Grain and Oilseed Milling	2,322
311211	Flour Milling	726
311212	Rice Milling	146
311213	Malt Manufacturing	67
311221	Wet Corn Milling	213
311224	Soybean and Other Oilseed Processing	134
311225	Fats and Oils Refining and Blending	666
311230	Breakfast Cereal Manufacturing	370
3113	Sugar and Confectionery Product Manufacturing	

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https://www.naics.com/six-digit-naics/?code=31-33

Largest Operators in the U.S.

Post Holdings Inc	Saint Louis	MO
Ingredion Incorporated	Westchester	IL
Treehouse Private Brands Inc	Oak Brook	IL
Gilster-Mary Lee Corporation	Chester	IL
Kellogg USA Inc	Battle Creek	MI
Tate Lyle Ingrdnts Amricas LLC	Decatur	IL
Kerry Holding Co	Beloit	WI
Clover US Holdings LLC	Downers Grove	IL
Stratas Foods LLC	Cordova	TN
Solae LLC	Saint Louis	M

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June Fire At Seed Mill Reported by PowderBulkSolids

Crews from several fire departments responded to a reported explosion at the Christensen Family Farms feed mill in Sleepy Eye, MN early Tuesday morning June 4, 2021.

Firefighters were dispatched to the Country Road 10 site at 4:45 a.m. after receiving word of the blast, according to a Brown County Sheriff's Office release published on Sleepyeyeonline.com. Personnel from five fire departments reported to the scene. Through a collaborative effort, all of Brown County came to the rescue to assist Christensen Farms this morning in an unfortunate incident," the sheriff's office said in a post to its Facebook page. "Every single fire department in Brown County as well as Sleepy Eye Police Department and Brown County Deputies were on scene. Luckily, no one was hurt when what was originally reported as an 'explosion' that occurred around 4:45 a.m. this morning."

Second Asst. Sleepy Eye Fire Chief Jeff Zinniel told the *New Ulm Journal* that the blast "blew the roof off" of a silo at the site and started a fire. The official said several other containers were damaged in the explosion
. https://www.powderbulksolids.com/food-beverage/explosion-damages-feed-mill-minnesota

Case histories are major TCO factors and can in part be obtained in articles such as those in PowderBulkSolids. The details on fires and explosions provide insights not only for potential customers but for design improvement which can lower total cost of ownership

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PowderBulkSolids Reports Grain Explosion at Landus

Agricultural firm Landus Cooperative announced that it will rebuild its Jefferson grain receiving and corn drying facility in Jefferson, IA and resume operations by the harvest this fall after a dust explosion and fire on May 14 severely damaged the site.

"We're so thankful to the local fire and rescue teams who responded to last Friday's emergency and even more thankful that no one was hurt," Matt Carstens, the cooperatives CEO and president, said in a recent release. "True to 'The Landus Way' of acting with agility, courage, teamwork, and speed, we are now forging ahead with the planning to rebuild to Jefferson location to be bigger and better than before."

Landus said it has launched an assessment of the causes of the incident and will perform corrective actions based on the findings. Two co-located facilities, the Landus Beef Feed Center and the Landus SoyChlor production plant, were not impacted by the explosion and blaze.

"An initial investigation following today's dust explosion at the Landus Jefferson has identified **smoldering grain** in a self-contained bin located next to the grain elevator the company said in a statement shortly following the incident. "A salvage company specializing in extinguishing grain is expected onsite this afternoon to safely remove the grain from the bin."

https://www.powderbulksolids.com/food-beverage/landus-reopen-iowa-grain-facility-following-dust-explosion

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PowderBulkSolids Reports Riceland Food Fire in May and Explosion last October

Firefighters were called to the Riceland Foods storage facility in Stuttgart, AR on Sunday evening after a blaze ignited at the site, several local news organizations reported.

The blaze ignited around 6:30 p.m., coverage by television news station KARK said. A Riceland spokesperson told the broadcaster that the incident occurred in a facility that was used to store soybeans. Riceland said personnel were engaged in cleaning the bins when the fire started, according to a Little Rock, AR-based Fox News affiliate. During the response, crews were forced to cut into the silos to douse the fire.

The company also operates a soybean processing plant and a complex to support its Rice Division in Stuttgart.

PowderBulkSolids reported in October 2020 that a combustible dust explosion occurred at the facility, minorly injuring three employees.

Here is a plant with multiple events in less than a a year so they need a new cost of ownership valuation

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Bakeries

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Blogs - Powder & Bulk Engineering Example

I work for a major bakery and one of my responsibilities is to ensure that we comply with the NFPA combustible dust standards. It appears we must comply with both NFPA 652 and 61. Is this correct?

- **Jack Osborn, Airdusco, says:**
- Unfortunately, you're correct. All industries handling or processing combustible dusts have to comply with the current National Fire Protection Association (NFPA) standards. That means complying with *NFPA 652: Standard on the Fundamentals of Combustible Dust — 2019 edition* and the appropriate commodity-specific NFPA standard, which in your case would be *NFPA 61: Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*.
- Your complaint is a common one since NFPA 652 became effective September 2015. One original purpose of NFPA 652 was to simplify the requirements necessary to protect-------
  https://www.powderbulk.com/ask-an-expert/ask-an-expert-jack-osborn-2/

- *TCO Factor comments: suppliers have to persuade customers that their products will meet the applicable regulations. Blogs have been proven to be very effective. However, they tend to be disorganized.*
- ***With IIoW links their effectiveness is greatly improved***

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Sugar

McIlvaine has conducted extensive analyze of beet and cane sugar operations and has done analysis of mechanical vapor recompression, pumps, valves, centrifuges and air pollution control LTCO

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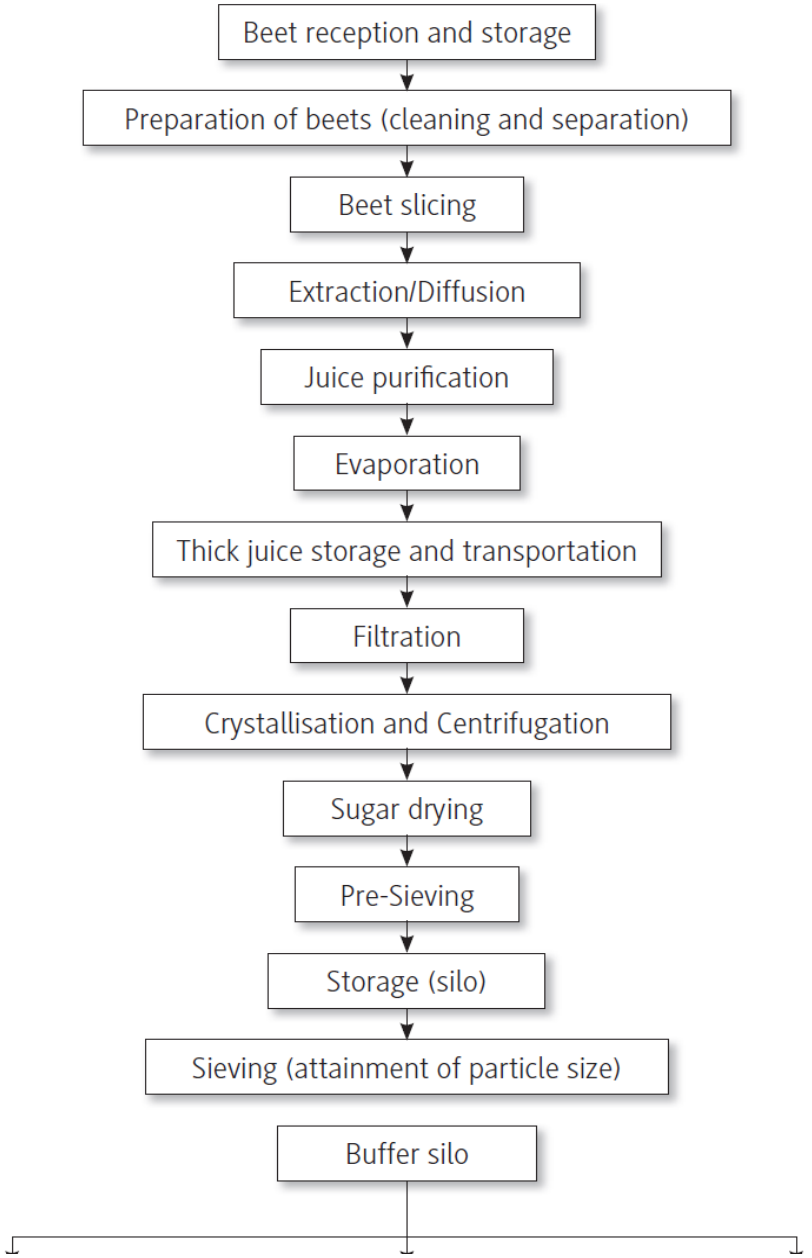
Beet Sugar

Beet reception and storage: After reception the sugar beets are stored shortly in the sugar factories in the beet yard. After cleaning the beets are cut into small pieces (“cossettes”) by slicing machines. • Extraction / Diffusion: In a continuous counter-current extraction process using water the cossettes are heated to around 70° C and desugarized. The obtained raw juice contains approx. 15 % sugar. • Purification: Besides sugar the raw juice still contains other natural components of the sugar beet. Most of these components are removed during the purification process which starts by mixing the raw juice with lime milk. Precipitation is accomplished by adding carbon dioxide. The generated calcium carbonate surrounds the precipitated non-sugar components that can be separated by filtering. After removal of the precipitants a light-yellow liquid remains – the thin juice. • Evaporation: The thin juice is concentrated in a multi-stage evaporation station under pressure and at high temperatures until the dry matter content of the resulting juice is about 70 % (thick juice). The thick juice is highly viscous, clear and light-gold in color.

Crystallization, drying, sieving, storage: The crystalline sucrose is obtained by concentrating the thick juice at reduced temperature and under vacuum. The suspension of crystals and syrup is passed via intermediate tanks into the centrifuges where crystals and syrup are separated. The obtained White Sugar is dried, cooled and pre-sieved, followed by storage. The sugar is distributed either as bulk or packaged. Besides sugar other products are obtained from sugar beet processing which are used for non-food purposes, like animal feed and fertilizer for agriculture.



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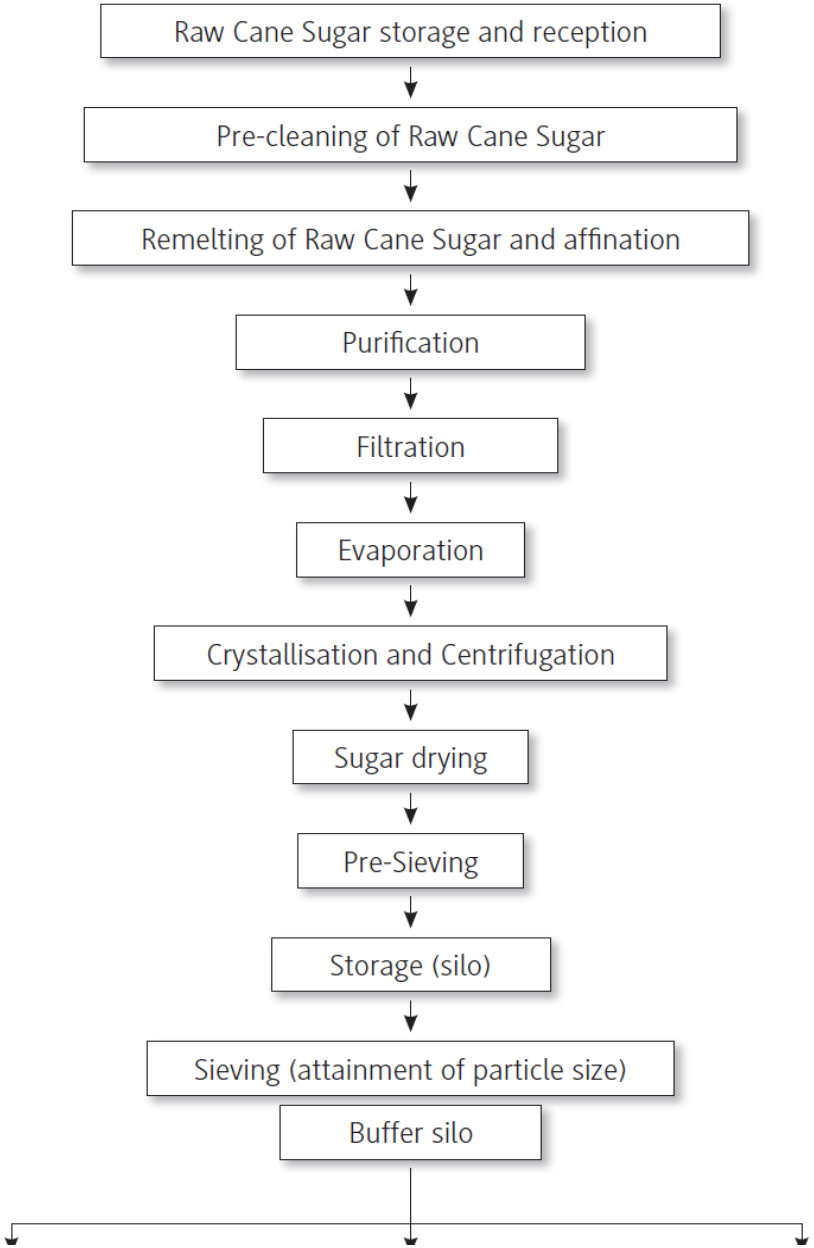
Raw Cane Sugar

After harvesting the sugar cane is transported to sugar mills for processing to raw cane sugar. For the refining process in Europe the raw cane sugar is purchased from overseas. The White Sugar is obtained through the following process steps outlined in the scheme:

TCO Factors: There are fire and explosion risks with beet sugar where processing takes place at one location. With cane sugar there are both the raw sugar and white sugar processes.

In addition raw cane sugar producers have processes to use bagasse as a fuel. Some are making bioethanol. All these processes are dealing with combustible dusts There are multiple associations with safety activities dealing with sugar. They hold conferences and are an excellent reference for suppliers to use in their persuasion process.



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Sugar cane technology conferences

- The **International Society of Sugar Cane Technologists (ISSCT)** is an association of scientists, technologists, managers, institutions and companies/corporations concerned with the technical advancement of the cane sugar industry and its co-products.

  The ISSCT has been in existence for 89 years during which it has organized **28 Congresses**, usually at 3-year intervals. The last Congress was held in Sao Paulo, Brazil, June 2013. The next **XXIX Congress** is scheduled **from 5 to 8 December 2016, in Chiang Mai, Northern Thailand**.

- Proceedings from the2013 conference in Brazil are available at a charge by contacting . **XXVIII Congress, Sao Paulo, Brazil, June 2013**
  Ms. Isabel Rocha at producaoissct@reedalcantara.com.br

  The ISSCT is governed by an Executive of 10 members elected every three-years by the Council which consists of representatives of the different Affiliated Societies (24) who meet during congresses. The Executive appoints a Technical Program Committee (TPC) which is responsible for monitoring the technical activities.

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The proceedings from these conferences were studied by McIlvaine in order to determine the cost of ownership for mechanical vapor recompression.

STAB is the Brazilian society of sugar cane technologists

- STAB is a private legal entity, with a non-profit nature and civil purpose, with the main objective of scientific, technical and cultural exchange between the various sugarcane producing regions of Brazil and abroad. Eighty-two technicians began their foundation movement on July 18, 1963. Today, STAB is undoubtedly the mainstay of Brazilian technicians working in the sugar and alcohol industry. In its work dynamics, STAB promotes meetings among technicians, through courses, seminars, symposia, workshops and congresses. These events allow a broad and deep discussion on the problems and solutions inherent in the participation of the sugarcane agroindustry in the technical, economic and social context of the country

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The sugar, grain, pharmaceutical and other societies in each country provide IIoW unique to that country

Imperial Sugar Installs 15 Conveying and Dust Collection Systems From Schenk

Following a major explosion Imperial Sugar subsequently embarked on a $200 million plus reconstruction project to rebuild the Port Wentworth, USA sugar refinery. The project team needed a solution to safely convey crystal sugar at high capacities over long distances with minimum product degradation occurring during transportation. Together with its sister company in the UK, (Clyde Process) Mac Process designed and installed 15 continuous dense phase systems at the refinery with rates at 68 tonnes per hour over total distances of up to 140 meters. These were complete systems with modularized dense phase vessels, Dome Valves®, airlocks and dust collectors.

In addition, Mac Process designed safety protection systems by applying the hierarchy of explosion protection principles. Pressure vessels were built for explosion containment. Conveying lines and ancillary equipment are fitted with either explosion venting or explosion suppression to minimize the chance of an event being propagated through interconnecting system
https://www.schenckprocess.com/data/en/files/693/bva9065gb.pdf

It was also linked from Powder and Bulk Engineering
https://www.powderbulk.com/white-paper/?fwp_white_paper_categories=dust-collectors-and-related-equipment

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Pharmaceutical

McIlvaine also publishes *Pharma Prospects* with alerts twice per week

http://home.mcilvainecompany.com/index.php/databases/83ai-pharma-prospects

Industry Segmentation and Number of U.S. Plants

NAICS Code	Descriptor	Number of Businesses
3254	Pharmaceutical and Medicine Manufacturing	12,542
325411	Medicinal and Botanical Manufacturing	1,271
325412	Pharmaceutical Preparation Manufacturing	9,342
325413	In-Vitro Diagnostic Substance Manufacturing	167
325414	Biological Product (except Diagnostic) Manufacturing	1,762

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***Pharma Prospects* has 78 articles on Pfizer and 3 of those are on dust control**

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1. Pharma Prospects Table of Contents

... Case Study Veolia provided WFI system for Pfizer Thermo Fisher launches first cleanroom-compatible CO2 incubator for **...** than ePTFE Cartridge Filter Captures Ambient Pharmaceutical Dust Bag Dump Module for Bulk Solid Equipment Industrial **...**

http://home.mcilvainecompany.com/index.php/databases/83ai-pharma-prospects

Company Profiles

- Algernon Pharmaceuticals
- AstraZeneca
- CanSino Biologics
- Gilead
- GlaxoSmithKline
- Heat Biologics
- Inovio Pharmaceuticals
- Johnson & Johnson
- Kogene Biotech
- Mateon Therapeutics
- Medicago
- Merck
-

The potential for dust explosions during pharmaceutical development and manufacturing is often overlooked. During processing and transporting, bulk powders can form airborne dust clouds and generate a static charge. In addition, the process containment systems designed to protect employees from potent compound exposure can create ideal conditions for high concentrations of airborne dust to collect inside processing vessels and equipment. These combined factors can lead to an increased risk for dust explosions during pharmaceutical processing operations.

Under the right circumstances, all materials can be explosive. Similar to hydrocarbon vapors, dust suspended in air can ignite and burn extremely rapidly. If these conditions occur in a confined area such as in processing equipment or in a manufacturing suite, a dust explosion may occur.

Moreover, dust explosions can release high pressures. Based on experience, It is common for active pharmaceutical ingredients (APIs) to be capable of releasing pressures in the 8–10 bar range, which is often considerably higher than the processing equipment's pressure rating.

Protection against dust explosions can be accomplished by preventing the explosion from occurring or by reducing the negative effects if the explosion occurs In the pharmaceutical industry, the fuel frequently is the API and, to a lesser extent, the excipients (*e.g.,* binders, coatings). Nonetheless, APIs have a wide range of explosivity and sensitivity to an ignition source (*e.g.,* between 1 and >1000 mJ).

Ignition source. An ignition source must provide sufficient energy to create an explosion. Ignition sources include open flames, exposure to hot surfaces, high temperatures, friction, mechanical impact (*e.g.,* metal–metal contact), electrical sparks, and electrostatic discharge.

In the pharmaceutical industry, however, the main ignition source tends to be from an electrostatic discharge, which can be generated by processes such as sieving, milling, pouring, mixing, and pneumatic transport. The grounding and bonding of equipment and tools minimize the risk of ignition.

Powder Bulk Exhibitors

McIlvaine is gathering information on all the exhibits relevant to protection from fire and explosions in dust collection systems.

Aerodyne - Stand 2340

Aerodyne has been providing cyclones to the Food and Grain industries for over 70 years. The cyclones have been used on dryers, seed cleaners, pet food suppliers, cereal manufacturers. They can operate in high humidity applications easily without the high maintenance of filters or the high wastewater production of wet scrubbers. Often used as pre-filters, the cyclone removes the majority of the dust particulate, leaving only the very fine dust to be handled by filters or wet scrubbers.

GPC Cyclone

Compact high-efficiency cyclone often used as pre-filters. Installation of cyclone pre-filters can extend filter life and minimize maintenance issues in baghouses and cartridge collectors. Many GPCs are small enough to fit within compact spaces allowing retrofitting of existing applications. The GPC is available in both vertical and horizontal designs so that it can fit into almost any area. The horizontal GPC can be modified for easy cleaning and/or installation of explosion vents.

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Aerodyne, cont.

Vacu-Valve

The Aerodyne Vacu-Valve is an economical alternative to high maintenance rotary valve. The Vacu-Valve uses the dust collector's vacuum to pull the sleeve together creating an airlock. As dust builds up over the valve, gravity and the weight of material above, slowly works the material through the sleeve. The Vacu-Valve works best on fine, free-flowing material that doesn't bridge. Often used on spray drying applications, the Vacu-Valve sleeve is easy to change out, keeping maintenance quick and simple.

Double Dump Valve

The Aerodyne double dump valve is a low leakage airlock. At all times, one portion of the valve is closed, so there is no direct route for air to leak out. The valve has a large area so oversized particulate can clear without fear of jamming or getting lodged in the valve. The double dump valve has been used in a variety of food applications including as an inlet into a pneumatic conveying system.

Knife Gate

The Aerodyne StopTight Knife gate has been used on hoppers for manual and pneumatic control of the hopper. The cast aluminum body and stainless-steel knife plate allow for easy control of the hopper. They are also ideal for installation above a rotary valve. When closed, they will isolate the system so the rotary valve can be sent to maintenance without shutting down the system.

Rotary Valve

Rotary valves are used in a variety of applications as an airlock. They isolate the dust collector from the outside

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Aerodyne, cont.

Explosive Applications

•Explosion vent – mounted on the dust collector, it allows an explosive overpressure to relieve in a controlled fashion preventing destruction of the dust collector and surrounding areas.
•Flameless explosion vent – similar to the above but designed to cool down the release so no flame is vented out. Can be used indoors.
•Chemical suppression – used to inject an inert material into the dust collector which will prevent the dust in the vessel from exploding.
•Thermal sensor – monitors the heat in the dust collector and is used to activate chemical suppression.
•Pressure sensor – monitors the pressure in the dust collector and is used to activate chemical suppression when over pressure is measured.
•Isolation gate – installed before the dust collector, this prevents an explosion in the dust collector from moving back into the building and the rest of the process.

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American Fabric Filter - Stand 2512

For nearly two decades American Fabric Filter Co. has been a leading provider of custom-made filter bags and transfer sleeves for the Food, Wood, Chemical and Mineral Industries. AFF began by designing and fabricating unique cloth filter bags and transfer sleeves for the diverse assortment of equipment found in food processing plants across the USA and Overseas. From there, AFF morphed into a provider for all types filtration products, connection sleeves, sifter screens and other industrial fabric goods.

As AFF's ability to make high quality custom filter bags, sleeves and one-of-a-kind specialty products became known throughout these industries, demand increased, and the company took the shape of what it is today. AFF has a staff of experienced technical sales designers working closely with its custom manufacturing facilities, and a network of sources to integrate many hard-to-find items. Fabric products from 3 inches long to 3 stories high are delivered daily

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Air Purification Inc - Stand 2905

Air Purification Inc. offers dust collector systems for all kinds of industrial air cleaning and industrial air filtering applications, including grinding dust, shot blast dust, cement and fly ash dust, wood dust, ceramic dust, sanding dust, rubber dust and mineral dust, and oil mist and smoke applications.

Many of the ingredients used in the manufacturing of pharmaceuticals are known to pose a risk of combustion, especially when a sufficient quantity of finely divided solid particles becomes suspended in the air. These ingredients may include organic materials (either natural or synthetic) as well as metallics. Pharmaceutical dust explosion hazards may occur in material charging operations, blending, granulation, drying, milling, compression, coating and dust collection operations.

Air Purification Inc. offers a full line of dust extraction and collection equipment that can be utilized to safely control pharmaceutical contaminants. Engineers can help you select the right product with the appropriate options and accessories such as explosion vents, safety after filters, rotary air locks and more to meet your specific application and facility needs.

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Boss Products – Stand 2117

The EV-VF VigiFlap Explosion Isolation valve has been designed, tested & certified to prevent the propagation of overpressure or flame front caused by a potentially catastrophic explosive event. Intentionally certified for “Intended Use”, the VigiFlap valve has been proven to function flawlessly when tested for dust collection suction and pressure side ducting installations.

All VigiFlap explosion isolation valves are 100% NFPA Compliant when ordered with the CP04 intrinsically safe control panel and dust level sensor

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BS&B – Stand 2924

BS&B Designs and Manufactures dust explosion protection solutions for industries handling combustible dusts.

We can provide protection for process equipment, handling dry combustible products, such as dust collectors, filter receivers, mixers, bucket elevators, milling systems, bins and silos.

Our solutions include conventional explosion venting, Flamefree™ Venting, Explosion Suppression and explosion isolation, including Chemical Isolation, Flap Style Valves and Pinch Valves.

BS&B offers engineering support and services to owners, operators, and engineering consultants. The company offers a large field service network to support clients and periodic inspections in accordance with codes and standards. Dust testing services are also available.

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CECO – Stand 1947

The company also offers wet scrubbers and thermal oxidizers.

The Flex-Kleen pulse jet design was one of the earliest and now there are 200,000 installations including some in pharmaceutical applications.

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Donaldson Stand (No stand # shown)

- There is a great deal of information about the Donaldson content marketing program elsewhere in this presentation
- One of the cost of the lowest total cost of ownership features is the approach using a number of small collectors rather than one large system.
- One advantage is reducing energy costs. If individual dust generation sources are not used at the same time, then energy is wasted with a central system.
- There are arguments pro and con for local vs central systems in terms of eliminating combustion.
- Donaldson is much more competitive in offering a number of small systems than in offering a central system.

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ENVEA - Stand 2105

- ENVEA Inc. is a global manufacturer of gas, dust, and flow analyzers, CEMS, and process monitoring equipment systems.
- NEW FOR 2020 - Sales of SWR systems for the bulk solids handling industry: measurement and monitoring of powders, granules, and dust. These systems and products provide solutions for mass flow, moisture, velocity, level, concentration, and particle size monitoring.
- ENVEA also manufactures a full range of dust measurement products for specific process conditions found in industrial applications: continuous particulate emission monitors, filter performance monitors, bag leak detectors, and sensors for industrial process. And as always: ENVEA provides complete engineering services, technical support, and parts for products and systems.

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Emerson - Stand 2620

Emerson provides automation for dust collector systems including valves, switches, actuators, and other components.

McIlvaine believes there is the opportunity for considerable reduction in cost of ownership by innovating with FIFO rather than LIFO pulsing for dry scrubber applications. For particulate the maintenance of a cake protects the bag. For dry scrubbing where sorbent reaction time should be maximized cake maintenance is counter productive.

Emerson has both the pulse jet valves and the capability to provide the complete solution.

Asco Pulse Jet Valve

Fike - Stand 2919

A facility's finest dust is often found within its dust collectors, meaning a rogue spark or flame has the ability to cause a violent deflagration. Connecting pipes and ducts laden with fuel may act as fuses that carry the deflagration into other areas of the facility, causing secondary downstream explosions. Whether selling into food and beverage, chemical or other industries, OEMs can trust Fike to design explosion vents and active explosion protection solutions to the specs of the individual customer's dust collectors.

Unlike many other flap valves, with Fike DFI™ you'll find no design shortcuts. No inferior parts or materials. No inaccurate testing and certifications. Just an ultra-reliable, compact passive explosion isolation valve that's tested and proven to perform accurately under pressures which it may experience during a deflagration.

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Fike has High Performance Rupture Disc for Pharmaceutical Applications

RD520 AXIUS® High Performance Rupture Disc is Smooth, Reverse-Acting, and is claimed to have the lowest burst pressure.

Designed to be used in aggressive chemical and pharmaceutical applications, the reverse-acting **AXIUS®** rupture disc is available in corrosion-resistant materials and has the tightest tolerances available.

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FLSmidth - Stand 2416

- The company supplies pneumatic conveying systems, valves, and dust collector bags and systems. It is the largest supplier of dust collectors for cement plants around the world.
- It offers ceramic filter elements with and without embedded catalyst for NOx control.
- It also offers glass bags with embedded catalyst for lower temperature NOx and VOC removal.
- Due to its many decades of experience in many countries it offers the knowledge of site specific TCO factors.

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Howden - Stand 1932

- Howden Roots designs, manufactures, and supplies Roots positive displacement blowers, centrifugal compressors, and control systems. Howden American Fan offers a range of axial and centrifugal fans. Products are used in applications such as wastewater aeration, iron ore reduction, flue gas desulphurization, pneumatic conveying, mechanical vapor recompression, ventilation, and dust/fume control.
- Its experience with fans and blowers exceeds any other company. In the case of mining ventilation this experience, and purchase of a software company resulted in a 24-7 mine safety monitoring system to prevent explosions and unhealthy conditions

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IAC (Industrial Accessories Company) - Stand 1614

- For more than 30 years, IAC says it has been the premier partner to the agriculture and grain processing industries. It has developed efficient solutions and technologies tailored for the unique needs of agricultural products and grain processing companies.
- From parts and maintenance, to capital equipment, to complete EPC and Turnkey plant builds, IAC is a single source solution provider.
- IAC has proven the ability for a single source solution at any demand level. This has been demonstrated with shale fracturing sand drying systems where it met the urgent industry need for new plants and now for service and parts.

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National Filter Media - Stand 1827

- National Filter Media Co. has been supplying engineered filtration solutions since 1906. It manufactures dust collection and liquid filtration products, such as baghouse bags, pressure leaf covers, and vacuum filters. Its technical product specialists are located all over North America and can provide solutions to help improve performance and lower the overall cost of ownership. National Filter Media solves filtration issues.
- NFM has very extensive experience with bag supply for dust collector applications and many successful installations to use as examples.

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Nederman MikroPul Stand 3216

- Nederman MikroPul is a leading supplier and innovator of industrial dust collection and product recovery systems. With more than 300,000 installations worldwide, the corporation says it provides the largest scope of technology to meet any filtration or gas-cleaning requirement.
- MikroPul invented the pulse jet filter and over the years has been acquired several times.
- Nederman is a large European based company with multiple divisions supplying bags, and wet scrubbers, and various dust capture devices

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Nordic Air - Stand 3005

- Nordic Air Filtration is a global manufacturer of air filters for dust collectors, baghouses, pneumatic conveying equipment, powder coating and laser cutting equipment, weld fume extraction, Gas Turbine inlet housings and more. Production facilities around the globe, including the U.S.A. Custom filtration solutions is a specialty.

Schenck - Stand 1905

- Schenck Process is a complete global source of highly accurate solutions for pneumatic conveying, mixing, blending, pulverizing, thermal processing, milling, sifting, screening, weighing, feeding and dust collection systems. For over 50 years, a strong commitment to research and development has led to the creation of some of the industry's most advanced products and technologies.

  It has been awarded hundreds of patents and been recognized by customers for providing custom solutions for their specific material handling needs. With sales, service, and manufacturing located throughout the world, the company is able to deliver solutions globally.

- The company is validating lower total cost of ownership factors as shown in red above.

  Patents provide IIoW support.

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Shanghai Bag Filtration Equipment - Stand 2430

- Shanghai Bag Filtration Equipment Company Ltd. (SBFEC) is one of the leading suppliers of bag filtration equipment in China. The company developed and produced the first pulse valve in China and supplies all kinds of bag dust collector accessories.
- The company has extensive experience and successful installations which it can utilize to validate its LTCO but these need to be available in in English.

Teijin Frontier - Stand 2142

- Teijin Frontier is the only company which can consolidate its own fiber spinning technology and product converting capability in the gas and liquid filtration market. Teijin Frontier will be showcasing a new bag-type filter using "NANOFRONT" high-strength ultra-fine(700 nanometer) polyester fiber that realizes high-efficiency dust collection, energy savings and long life.
- It will market the NANOFRONT Bag Filter mainly to manufacturers of cement, steel and powder industries. The bag's inside is lined with ultra-fine NANOFRONT fibers, which have a diameter of just 700 nm, creating a finely porous structure for the extra-efficient collection of dust and powder. The NANOFRONT Bag Filter can reduce fine powder dust emissions by nearly half compared with existing fluorinated-resin membrane bags.

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The NANOFRONT Bag Filter improves ventilation volume by nearly 50% compared with fluorinated-resin membrane bags, and the interval between cleanings to remove dust and powder is prolonged by about 40%.
The NANOFRONT Bag Filter is also expected to improve productivity by more than 10% by and reducing the cleaning duration. Furthermore, the NANOFRONT Bag Filter is expected to last longer thanks to its thick fiber layers.

There is a very large IIoW for nanofibers and improved performance. McIlvaine writes monthly articles on media cost for IFN. Here is one on nanofibers.
https://www.filtnews.com/mobility-applications-provide-significant-opportunity-for-nanofiber/

IFN is owned by INDA which is the association of nonwoven manufactures. There is also a yearly exhibition. McIlvaine is on the conference committee and is helping create sessions to address TCO factors.

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Tri-Mer - Stand 2910

Tri-Mer Corp. manufactures wet and dry air pollution control systems for SO2, HCl, HF, Cl2, NOx, odors, hex chrome, and particulate. It offers the Whirl/Wet dust collector, 99%+ efficient for a wide range of micron sizes with low operating cost, low water use, and no internal moving parts; Tri-Flow dry dust collector with HEPA-level performance, 99.999% efficient on 0.5+ micron particulate; packed-bed tower scrubbers; and crossflow scrubbers.

Tri-Mer has been the leading U.S. supplier of fabric filters with high temperature ceramic candles to remove dust and NOx. Major TCO factors are heat recovery and capital cost reduction when two pollutants are captured in one device.

Dry dust collector with high efficiency

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Associations and Technical Resources

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The Grain Elevator and Processing Society

Mission/Vision

- Mission Statement: To advance grain industry knowledge and information sharing through a network of global agriculture professionals.
- Vision: To be the Knowledge Resource for the Grain Handling and Processing Industry

Objectives/Values:

- Information: Generate information, education and training programs to meet operations needs
  Innovation: Promote operations efficiency through innovation and technology
  Networking: Provide forums for networking, problem-solving and solution-sharing
  Professionalism: Develop excellence in leadership and professionalism
  Quality: Promote quality in grain operations
  Safety and Sustainability: Encourage and enable safety, health and environmental responsibility

Core Competencies

1. Grain Quality
2. Facility Maintenance and Design
3. General Industry Operations
4. Risk Management
5. Human Resources

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Grain Elevator and Processing Society On-line Webinars

Webinar: Harvest Safety Review

Joe Mlynek

Safety Made Simple

An overall safety review before harvest season is vitally important for any grain handling or processing facility. This webinar will explain the importance of accountability from a super/manager perspective. It is also going to highlight the importance of training for seasonal workers and the dangers of worker fatigue during the harvest season. You will learn […]

Greater Nebraska Chapter Presents: Safety & COVID-19

Marc McClure

Topics include How OSHA is conducting virtual inspections How leading states like Oregon and Virginia are implementing responses to the pandemic Changes to OSHA's COVID-19 protocol Training resources available About the Speaker Marc McClure has over 25 years of safety experience in general industry and construction. Marc has successfully implemented behavior and culture improvement processes […]

Webinar: Where Grain Quality and Safety Meet – Panel Discussion

Look at practical tools, new technologies and hands-on methods to help monitor and maintain quality in your grain inventory. You can't separate grain quality and safety. Managing projected carryover inventories and the anticipated size of the 2020 crop will provide the foundation for employee safety, grain quality, and financial stability. Panelists: Bob Marlow, owner, Operations […]

Webinar: Regulatory Update – OSHA EPA & COVID-19

Jess McCluer

Stay on top of **emerging regulatory issues within the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA). Topics include OSHA's and EPA's policies, rule-makings and interpretations on continued enforcement within the grain handling industry;** injury and illness record keeping; combustible dust; walking working surfaces; and temporary storage. Presented by: Jess McCluer, […]

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Scheduled PBE Webinar: Preventing Dust Explosions in Your Dust Collector – The Basics

Date: 11/09/2021
Time: 12:00 PM (Noon) ET
Presented by: Eric Maynard
Moderated by: PBE Editorial Staff
Cost: FREE
Register Now!

Webinar Details:
The dust collector is known to be one of the most probable locations for a dust explosion event. Have you considered methods to prevent or protect against the dangerous implications for a dust explosion event with your dust collector(s)? If not, this webinar will provide valuable groundwork to help you understand the basic safety considerations to protect your vital dust collection equipment.

Presenter Information:
Eric Maynard is a vice president at Jenike & Johanson. He received his BS in mechanical engineering from Villanova University and his MS in mechanical engineering from Worcester Polytechnic Institute
https://www.powderbulk.com/webinars/preventing-dust-explosions-in-your-dust-collector-the-basics/

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Videos Available Through Powder and Bulk Engineering

Boss Products LLC

Fire and Explosion Mitigation

Length - 3:01

Boss Products is committed to helping you meet and exceed today's strict NFPA regulatory guidelines governing your industry. That is why we provide a full range of fire and explosion mitigation solutions - including prevention, isolation, diversion, and venting - which address potential hazards in the industrial filtration and process industries.

- The Original of Flameless Venting - REMBE® Q-ROHR®Length - 1:58
- A widely used measure to protect against damage caused by combustible dust explosions is venting with explosion panels. Our bestseller, the Q-Rohr, protects industrial plants worldwide. No matter what the type of dust/industry—food, pharma, chemical or metal dusts, hybrid mixtures or gases—the REMBE Q-Rohr can safely handle them all, keeping explosions in check. It efficiently protects personnel, the environment and equipment and ensures that manufacturing can continue safely and smoothly, even within a building. It is the ultimate explosion retention solution!

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PowderBulkSolids Vendor Articles

If your dust is combustible, you need to add explosion protection components to your dust collection system.

John Milius, business development manager, Parker Hannifin Corp., Industrial Gas Filtration and Generation Div. | Jun 10, 2021, discussed air locks and valves. The company also supplies collectors

https://www.powderbulksolids.com/dust-collection-air-pollution-control/industrial-combustible-dust-solutions

Airlocks serve an important function within dust collection systems.

Jeff Spisak, regional airlock sales manager, Prater Industries Inc. | May 18, 2021 said that Without an airlock, dust would simply escape via the discharge valve, essentially negating the whole system

https://www.powderbulksolids.com/valves-gates-airlocks/importance-airlocks-dust-collection-systems

Lottermann tells Powder & Bulk Solids what it's like to work as Chief Business Development Officer Explosion Safety for explosion safety and pressure relief solutions firm REMBE. John S. Forrester | Apr 06, 2021

Dr.-Ing. Johannes Lottermann said For our daily work at REMBE, one of the most challenging aspects however is to keep up with new processes and products at our clients and our task to understand the process and especially assess its risks, serve them appropriately and eventually safeguard it with reliable solutions.

(Advertisement for Parker BHA Total pleat appears prominently in this article)

https://www.powderbulksolids.com/career-development/why-im-engineer-johannes-lottermann-rembe

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The large number of vendor-based articles provide considerable supplier validation of TCO Factors

Advertising in PowderBulkSolids and DKY-Donaldson and Combustible Dust

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Recent Advertisements in Powder and Bulk Solids		
Parker BHA	Total Pleat Filter Elements	Longer life and lower pressure drop
Cyclonaire	Bin Vent Collector	Excellent filtration at destination points such as bins, hoppers and silos.
IEP Technologies	Explosion Protection Systems	The risk, the hazard, the solution

The Parker BHA advertisement shows up continually while searching the magazine. The longer life, greater efficiency, and lower pressure drop are highlighted. The ad links to the more detailed lower cost of ownership claims.

The other two ads were small and only appeared occasionally

The magazine provides potential effective communication with customers but primarily from extensive articles and news releases. Advertising for Parker Templeat is extensively and strategically displayed along with articles relating to TCO.

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DKY Helps Donaldson Produce Content and Enhance SEO

"Thought leadership programs are valuable in building credibility, especially with business and technical customers. A survey by IEEE found that 90% of engineers are more likely to do business with companies that regularly produce content. Donaldson Company, a leading maker of industrial dust collectors, **has deep expertise in the topic of combustible dust—and wanted to share it, with DKY's help.**

Co-writing with Donaldson's technical experts, we placed articles in trade journals serving niche markets such as chemical, food, and powder producers. A *Chemical Processing* piece won a national "how-to" award from the American Society of Business Publication Editors and remains in a prominent spot online on the publication's combustible dust page.

There are multiple steps to safeguarding a facility, so we helped Donaldson clear up confusion by developing a helpful visual roadmap. Donaldson posted it on their website, and we purchased insert space in *Powder & Bulk Engineering* for distribution to 30,000+ readers.."

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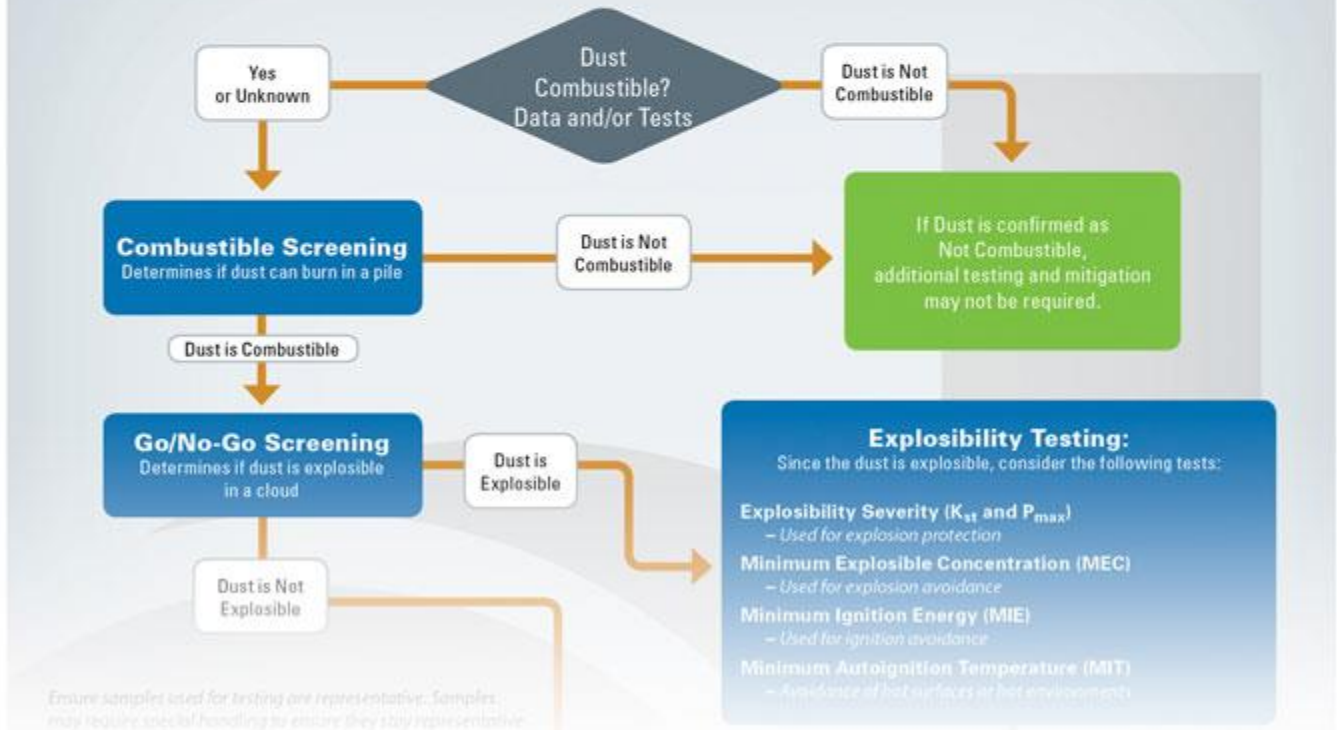
COMBUSTIBLE DUST ROADMAP

This Roadmap is a high-level summary of steps for a process owner to consider if combustible dust may be produced or handled in their facility. The process owner's final selection of dust collectors and risk mitigation strategies should be based on the outcome of a Dust Hazard/Process Hazard Analysis performed by the facility owner. Although early engagement of a dust collector supplier provides helpful insights on the availability and features of various products, facility owners should consult with a combustible dust expert and/or a process safety expert before making actual product and mitigation strategy selections.

Dust Hazard Analysis [DHA]:

Completed and Maintained by the Process Owner

A Dust Hazard Analysis allows a process owner to determine potential combustion risks for dusts produced or handled in their facility.

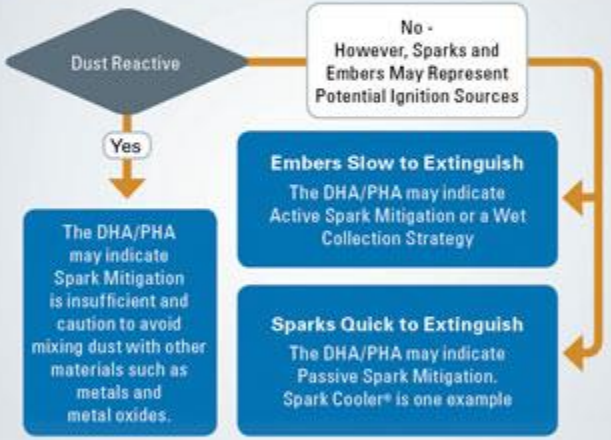


EXAMPLES OF MITIGATION SELECTIONS

The results below reflect common situations; however, mitigation strategies are influenced by variables not included in this simplified chart. Process owners should use the outcome of their DHA/PHA and discussions with mitigation strategy experts before making actual strategy selections.

Prevention:

Ignition Source Mitigation Strategy Considerations



Reactive Example: Aluminum & Metal Oxide (thermite reactions)

Fire Protection:

Extinguisher and Return Air Considerations

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Trade Article Placements Reinforced with Ads

"DKY is building relationships with targeted editors on behalf of five business units at Donaldson, and the credibility of company experts has generated more than **50 trade article placements over two years. By offering genuine education, editors have come to trust our material and link to Donaldson's website for more information.** We also rewrite the placements for Donaldson's website, which can have a positive impact on SEO, and the content is promoted through email and LinkedIn campaigns.

Reinforce with Paid Messages

Finally, when we earn a placement, the marketing side of DKY reinforces the Donaldson brand with paid advertising in the same issue. At DKY, you can count on teams coordinating efforts across owned, earned, shared, and paid media for greater total impact."

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Combustible Dust Mitigation Updates for Food Manufacturing Facilities

The National Fire Prevention Association has published updated requirements to its NFPA 61 standard for preventing fires and dust explosions in agricultural and food processing facilities.

While food manufacturers generally have until 2021 to comply, undertaking the initiative sooner could potentially save you time and money, as you integrate process equipment upgrades with implementation of a revised combustible dust strategy.

Let's review recent changes.

NFPA 61 provides guidance on combustion risks in facilities handling, processing, or storing bulk agricultural materials, their by-products, or other agricultural-related dusts and materials. Although NFPA standards are not federal law, they become legally binding in local and state municipalities that have adopted them as regulatory code. In addition, OSHA can reference NFPA standards when levying fines for unsafe work environments under the General Duty clause.

The new version of NFPA 61 better aligns with NFPA 652, "Standard on the Fundamentals of Combustible Dust," to offer clarification on how to determine whether materials present in a process are combustible or explosible. This is an important responsibility for the owner or process operator, and needs to be the first step in a risk mitigation plan.

The standard also introduces guidance on conducting a Dust Hazard Analysis (DHA). If you have a potentially


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Tackle Combustible Dust Risks
Following a roadmap may help you assess your hazards and develop a mitigation strategy
By Karen Wear, Donaldson Company
Jun 13, 2017
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Whether you're a chemical engineer designing production equipment or one supervising operations and maintenance, you need to be aware of combustible dust risks. Increasing fines and incidents, such as the deadly 2013 explosion at the West Fertilizer Company site near Waco, Texas, are impacting the chemical industry.
This article provides a roadmap for evaluating your dust and process hazards, and suggests steps to plan a suitable mitigation strategy for your unique risk profile.
The Regulatory Landscape
Chemical processors must balance product output with the responsibility to address risks posed by dust-producing materials and processes. How you address such risks impacts production and how your plant fares during inspections from a growing host of regulators. Such "authorities having jurisdiction" (AHJs) include fire marshals, insurance appraisers, code enforcers and U.S. Occupational Safety and Health Administration (OSHA) inspectors. AHJs can prosecute, issue fines, deny permits or even shut down production if they consider the way you address your hazards to be unacceptable.
AZBEES
ASBPE Awards of Excellence
2018 Azbee Awards of Excellence Winner
This article won a National Silver editorial award in the "How To" category
American Society of Business Publication Editors (ASBPE) Azbee Awards are highly competitive and celebrate the highest quality reporting, editing and design in business-to-business, trade, association and professional publications. The awards honor all types of publications including magazines, newspapers, newsletters, websites, and digital media.
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